158-8 - LARGE SWINGS IN TROPICAL WATER BALANCE DURING A 'WEAK' INTERGLACIAL (MIS 15) SUGGEST A LINK TO PRECESSION-INDUCED MONSOON VARIABILITY

Tuesday, 17 October 2023

10:15 AM - 10:30 AM

334 (3, David L Lawrence Convention Center)

Abstract

Atmospheric water vapor is predominately sourced from the tropics, such that characterizing the link between the tropical water cycle and global climate is of critical importance. Studies of central Andean climate from Lake Junín (11 °S, Peru) show that tropical glacial extent tracks global ice volume at a ~100 ka periodicity for the last 6 glacial cycles, indicating a tight coupling between tropical water balance and high latitude climate. However, it can be difficult to decouple temperature, precipitation, and water balance histories from records of glacial extent, especially for older intervals. In this work, we focus on one such interval, MIS 15 (621–563 ka), when the connections between tropical Andean water balance and global climate seem different than the last glacial cycle. Globally, MIS 15 was a weak interglacial, with cool temperatures and low GHG concentrations, however, the Lake Junín glacial record suggests an amplified hydroclimate response to this interglacial, stronger than any other over the last 700 ka. Causes for this apparent tropical amplification may be due to large, precession-paced changes in meridional insolation gradients that exceed other interglacials owning to enhanced orbital eccentricity. Given that the role of precession on South American monsoon strength over the last glacial cycle is well established, we hypothesize that monsoon strength may have been highly variable during MIS 15 and forced changes in central Andean water balance and glacial extent. To test this, we reconstructed temperature and evaporation histories using carbonate clumped and triple oxygen isotopes of Lake Junín sediments. Preliminary results suggest temperatures were relatively stable, but possibly lower than both the present and Holocene, consistent with cool global climate at that time. Triple oxygen isotope values vary substantially, indicating massive swings in lake hydrology, between open and (nearly?) closed basin hydrology on a ~12 ka cycle that exactly match insolation variations. From this work, we conclude that hydrologic change in the central Andes was rapid and extreme during MIS 15, owning to profound changes in monsoon strength. Given that monsoons in other sectors are also sensitive to insolation changes, our work could suggest pervasive hydrologic variability throughout the tropics at this time.

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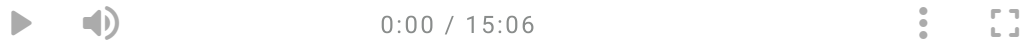

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